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# Adverse Childhood Experiences: Increased Likelihood Of Socioeconomic Disadvantages For Young Adults

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**ABSTRACT** More than 60 percent of US adults report that they had adverse childhood experiences (ACEs). For this study of 930,000 children born during the period 1999–2003, we used linked administrative, survey, and criminal justice data to measure the association between ACEs (parental death; separation; incarceration; or criminal charge for intimate partner violence, substance use disorder, or child sexual or nonsexual abuse) and socioeconomic disadvantages at ages 18–22 during 2017–21. After childhood socioeconomic status was controlled for, young adults with ACEs were more likely to have been charged with felonies, have become teenage parents, live in a household with poverty or housing assistance, be enrolled in Medicaid, and be employed, and were less likely to be enrolled in an educational institution. These outcomes were most likely among young adults with multiple ACEs or lower childhood socioeconomic status. Using new linked data opportunities, this study provides large-scale, person-level longitudinal evidence of the long-lasting and substantial societal cost of ACEs.

**M**ore than 60 percent of US adults report that they had adverse childhood experiences (ACEs)—preventable, potentially traumatic events such as neglect, experiencing or witnessing violence, having a family member attempt or die by suicide, having a caregiver negatively affected by substance use or a mental health condition, or instability due to prolonged separation from a caregiver.<sup>1–4</sup> Adults with ACEs have more unhealthy risk behaviors and worse health outcomes.<sup>5–7</sup> The estimated lifetime societal cost of ACEs-related poor health in the US is \$2.4 million per affected person and is even higher with multiple ACEs.<sup>8</sup> ACEs are prevalent among juvenile justice-involved populations, and cross-sectional surveys of adults indicate that ACEs are associated with unemployment, poverty, Medicaid usage, lower educational attainment, criminal justice involvement, and intimate part-

ner violence in adulthood.<sup>9–13</sup>

Most investigations of the long-term impacts of ACEs are based on cross-sectional, self-reported past exposures among adults; address primarily health outcomes; and do not address childhood socioeconomic status.<sup>14,15</sup> This study aimed to use individual-level linked administrative and survey data in combination with a new criminal justice records database (the Criminal Justice Administrative Records System, or CJARS) to longitudinally examine the association between ACEs and socioeconomic disadvantages among young US adults.<sup>16</sup>

## Study Data And Methods

In this retrospective observational case-control study, we assessed indicators of childhood adversity (younger than age 18) and socioeconomic status in young adulthood (ages 18–22) among the population born during the period 1999–

2003 in four states (Maryland, Michigan, North Carolina, and North Dakota), using the Census Bureau's anonymized Protected Identification Keys.

**DATA SOURCES** Person-level data were assessed across multiple data sources, including CJARS, the decennial census, the Census Bureau's Numerical Identification file (Census Numident), and the Census Bureau's American Community Survey, as well as data from the Internal Revenue Service (IRS), Department of Housing and Urban Development (HUD), and Centers for Medicare and Medicaid Services (CMS).<sup>17–22</sup> Protected Identification Keys do not contain personally identifiable information.<sup>23,24</sup> This study did not constitute human subjects research (Common Rule, 45 CFR Section 46).

**METHODS** Study outcome measures were ACEs incidence by type and the estimated average marginal effect of individual ACEs (for example, parental incarceration) and cumulative ACEs (1, 2–3, 4 or more, or any) on young adult socio-economic status measures. Analysis was conducted using Stata, version 18. The online appendix details sample construction (appendix exhibits A1–A5); comparison of ACEs incidence measures from this study versus from the Behavioral Risk Factor Surveillance System (BRFSS) and National Survey of Children's Health (NSCH), which are prominent federal self-reported and caregiver-reported survey sources (appendix exhibit A6); timing of exposure and outcome measures (appendix exhibit A7); survey weights; and complete model results (appendix exhibits A8–A17).<sup>25</sup>

► **SAMPLE SELECTION:** CJARS is a new unified data infrastructure for measuring individuals' longitudinal interactions with the criminal justice system, including arrests; criminal court case filings; and terms of probation, incarceration, and parole.<sup>21</sup> Comprehensive data on felony charges and incarceration sentences were available for the four study states at the time of analysis. The eligible study population ( $N = 1,650,000$ ) included people born during 1999–2003, as reported in the Census Numident and the Census Household Composition Key, which identifies anonymized parent-child linkages on the basis of applications for Social Security numbers, plus cohabitation indicated by sources such as IRS 1040 forms and decennial censuses. The study analysis sample ( $n = 930,000$ ) comprised people also reported in the 2010 census who had complete key data (race and ethnicity from the Census Bureau Best Race file and parents' adjusted gross income from 2000 IRS 1040 individual tax returns).<sup>17,18</sup>

► **ACES INCIDENCE MEASURES:** ACEs were selected for analysis on the basis of long-standing

measures in the BRFSS (adult respondents addressing childhood experiences) and NSCH (caregiver respondents reporting for children).<sup>26,27</sup> Parental death was identified using the Census Numident when study subjects were ages 0–17. Parental separation was identified using the 2010 decennial census (study subjects were ages 7–11, depending on birth year), if a parent identified in the Census Household Composition Key was no longer coresident with the study subject. Parents with incarceration sentences (any crime); an intimate partner violence criminal offense charge; or felony charges related to substance use disorder (SUD: drug possession, drug trafficking, or driving under the influence), child nonsexual abuse (for example, physical or emotional abuse or neglect), or child molestation (that is, sexual abuse) were identified in CJARS when study subjects were ages 0–17, limited to times when the parent and study subject child were coresident.<sup>18,20,28</sup>

► **SOCIOECONOMIC MEASURES:** Young adult socioeconomic status indicators (household poverty, household housing assistance, Medicaid enrollment, employment status, and education enrollment) and factors that typically portend disadvantage (felony charge and teenage birth)<sup>29–31</sup> were observed among study subjects at ages 18–22 during 2017–21 (teenage birth was observed at ages 13–19 during 2012–21). Felony charges among study subjects any time during 2017–21 were identified in CJARS; the oldest study subjects (those born in 1999) were observed during ages 18–22, and the youngest study subjects (those born in 2003) were observed during ages 18–19 ( $n = 930,000$ ). Teenage birth was assessed among the entire analysis sample ( $n = 930,000$ ) and identified in the Census Household Composition Key when a study subject appeared as a parent on a Social Security number application. Being part of a household that received rental housing assistance any time during 2017–21 was assessed using HUD's Longitudinal Public and Indian Housing Information Center and Tenant Rental Assistance Certification System ( $n = 930,000$ ). Analysis of study subjects' self-reported education enrollment (high school or college) and being a member of a household with self-reported income below the federal poverty threshold was limited to study subjects with American Community Survey records during 2017–21 ( $n = 23,000$ ). Medicaid enrollment was assessed any time during 2017–19 (when participants were ages 18–21) and limited to study subjects born 1999–2001 to observe outcomes for those age 18 or older in the CMS Transformed Medicaid Statistical Information System data available at the time of the study ( $n = 570,000$ ). According to available data, em-

ployment was assessed only in 2021 (participants ages 18–22, depending on birth year) using IRS W-2 information returns (that is, required filing for employers if people earned \$600 or more that year) ( $n = 930,000$ ). Exhibit 1 summarizes our measures, sample sizes, and data sources.

► **STATISTICAL ANALYSIS:** Changes in the probability of socioeconomic disadvantages as-

sociated with ACEs were calculated using average marginal effects (Stata *margins*, *dydx*) from this study's primary logistic regression models (model 1; a separate model was analyzed for each socioeconomic measure) (Stata *logit*), which measured the association between the seven binary young adult socioeconomic indicators (for example, housing assistance) as dependent variables and the seven assessed ACEs binary expo-

#### EXHIBIT 1

##### Sample characteristics, study of association between adverse childhood experiences (ACEs) and socioeconomic disadvantages, among people in 4 states who were ages 18–22 during 2017–21

Measures	% or mean (SD) <sup>a</sup>	Sample size	Data sources
Female, %	48.5	930,000	Census Numident
Race, %			Census Bureau Best Race
White	69.3	930,000	
Black	21.1	930,000	
AIAN	0.9	930,000	
Asian/NHPI	2.4	930,000	
Some other race	1.7	930,000	
Multiracial	4.7	930,000	
Ethnicity, %			Census Bureau Best Race
Hispanic	6.2	930,000	
Birth household			
Dual parent, %	80.8	930,000	CHCK
Household income, \$	62,250 (154,200)	930,000	IRS 1040 2000
Parental poverty, %	20.2	107,000	Census 2000 SEDF
Parental high school diploma, %	41.4	107,000	Census 2000 SEDF
Parental US citizenship, %	97.0	107,000	Census 2000 SEDF
Parental disability, %	14.1	107,000	Census 2000 SEDF
ACEs by type, %			
Parental death	1.6	930,000	Census Numident
Parental separation	26.0	930,000	2010 census
Parental incarceration	3.7	930,000	CJARS
Witnessing IPV	1.0	930,000	CJARS
Parental SUD	14.0	930,000	CJARS
Physical or emotional abuse	0.5	930,000	CJARS
Sexual abuse	1.7	930,000	CJARS
No. of ACEs, %			
1	26.0	930,000	Calculated
2–3	9.6	930,000	Calculated
4 or more	0.3	930,000	Calculated
Any	35.9	930,000	Calculated
Young adult outcomes, %			
Felony charge	5.2	930,000	CJARS
Teenage birth	2.0	930,000	CHCK
Poverty	16.9	23,000	ACS
Housing assistance	4.7	930,000	HUD PIC/TRACS
Medicaid enrollment	35.1	570,000	CMS T-MSIS
Employment	79.2	930,000	IRS W-2
Education enrollment	62.1	23,000	ACS

**SOURCE** Authors' analysis of data from multiple sources in the Census Bureau Data Linkage Infrastructure; authors' analysis of events during 2017–21 among 23,000–930,000 people (ages 18–22) born during 1999–2003 in Maryland, Michigan, North Carolina, and North Dakota. **NOTES** Percentages might not sum to 100 percent because of rounding. AIAN is American Indian or Alaska Native. NHPI is Native Hawaiian or other Pacific Islander. CHCK is Census Household Composition Key. IRS is Internal Revenue Service. SEDF is Sample Edited Detail File. CJARS is Criminal Justice Administrative Records System. IPV is intimate partner violence. SUD is substance use disorder. ACS is American Community Survey, 2017–22. HUD PIC/TRACS is Department of Housing and Urban Development Longitudinal Public and Indian Housing Information Center/Tenant Rental Assistance Certification System. CMS T-MSIS is Centers for Medicare and Medicaid Services Transformed Medicaid Statistical Information System. <sup>a</sup>All numbers in this column are percentages except for household income, which is dollars (mean and standard deviation).

# **Analysis of cumulative ACEs supported previous studies documenting a dose-response relationship between ACEs and harmful long-term outcomes.**

sures (for example, parental death) as independent variables, controlling for study subject birth year (1999–2003), state of birth (Maryland, Michigan, North Carolina, and North Dakota), sex (male and female), race (White, Black, American Indian or Alaska Native, Asian/Native Hawaiian or Pacific Islander, some other race, and multiracial), ethnicity (Hispanic), family structure at birth (single mother, single father, and dual parent), and childhood socioeconomic status (year 2000 parental adjusted gross income from IRS 1040 tax filings; in the case of multiple households, the higher household income was used). Sensitivity analyses tested the effect of childhood socioeconomic status; model 2 did not include the control for study subjects' childhood household income, and model 3 added more socioeconomic status indicators from study subjects' childhoods among a smaller sample of study subjects with available data from the 2000 census Sample Edited Detail File ( $n = 107,000$ ). The additional variables for model 3 were at least one parent with household poverty, high school completion, US citizenship, or a disability (that is, self-reported limiting physical, mental, or emotional disability). Models using American Community Survey or Sample Edited Detail File data employed person-level survey weights.

**LIMITATIONS** We acknowledge several limitations. In using administrative and criminal justice data sources, this study applied objective but very conservative measures of ACEs exposure. Associations between ACEs and young adult socioeconomic disadvantages were underestimated because children with ACEs who did not come to the attention of the criminal justice system were included in the control sample (no ACEs), as were children with ACEs linked to

non-cohabitating parents. This study assumed that parental felony charges for child abuse while the parent and child cohabitated included the child as a victim. This was a limitation of available data (CJARS does not include victim information) but is reasonable, given that nationwide child welfare administrative data indicate that nearly 90 percent of child abuse victims had a parent perpetrator.<sup>32</sup> This study's measure for parental incarceration included only prison sentences, which may be reasonably interpreted as more disruptive to children's lives than jail sentences as a result of their longer duration. This study relied on data derived from probabilistic parent-child record linkages, which are widely used but have drawbacks.<sup>24,33</sup> This study's primary regression models controlled for childhood socioeconomic status using a single year of parental income; parental separation was assessed only in 2010, and study subjects' employment as young adults was assessed only in 2021. Census Bureau Protected Identification Key methods are known to underrepresent Hispanics because this ethnic population has a higher prevalence of undocumented people and more record linkage challenges such as compound family names (see appendix section A).<sup>25</sup>

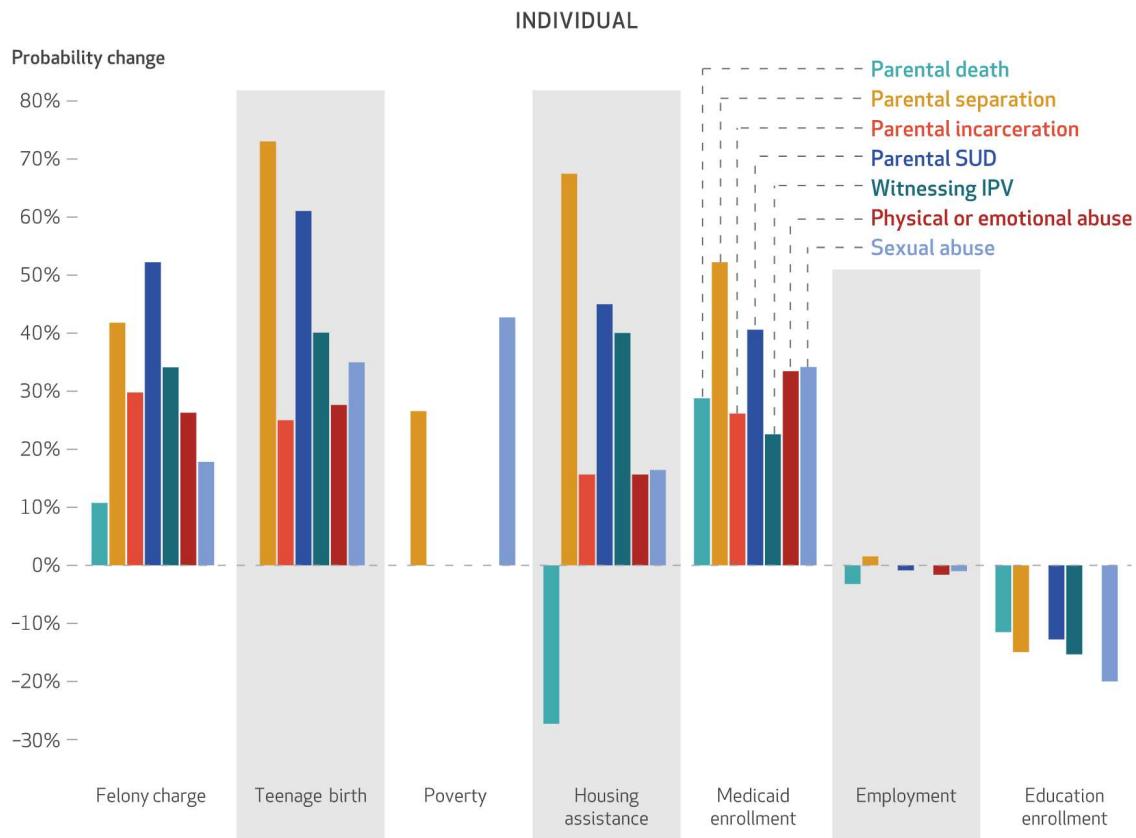
## **Study Results**

**ACES INCIDENCE** ACEs incidence estimates for parental death (1.6 percent of the study sample) and parental separation (26.0 percent), using this study's administrative and census data source measures (exhibit 1), were comparable in magnitude to the most recent nationwide self-reported BRFSS and parent-reported NSCH incidence estimates (appendix exhibit A6).<sup>25</sup> This study's parental SUD incidence estimate (14.0 percent) was lower than the comparable measure in the BRFSS but higher than in the NSCH. This study's estimated incidences of parental incarceration (3.7 percent), witnessing intimate partner violence during childhood (1.0 percent), physical or emotional child abuse (0.5 percent), and sexual abuse (1.7 percent), based on parental felony charges, were lower than comparable estimates in the BRFSS and the NSCH, which both used broader definitions of exposure (exhibit 1 and appendix exhibit A6).<sup>25</sup>

**INDIVIDUAL ACES** Controlling for childhood socioeconomic status, young adults with ACEs had a higher probability of having felony charges compared with other young adults (from 11 percent [parental death] to 52 percent [parental SUD] higher probability) (appendix exhibit A17, model 1, and exhibit 2, which visualizes statistically significant model 1 results).<sup>25</sup> This association ceased to be statistically significant for study

## EXHIBIT 2

**Probability changes in socioeconomic disadvantages associated with individual adverse childhood experiences for people in 4 states who were ages 18–22 during 2017–21**



**SOURCES** Authors' analysis of data from multiple sources in the Census Bureau Data Linkage Infrastructure; authors' analysis of events during 2017–21 among 3,400–930,000 people (ages 18–22) born during 1999–2003 in Maryland, Michigan, North Carolina, and North Dakota. **NOTES** Only statistically significant model results are depicted in this figure ( $p < 0.05$ ). SUD is substance use disorder. IPV is intimate partner violence.

subjects with parental death or parental felony charges for physical or emotional abuse when additional childhood socioeconomic controls were included among the smaller analysis sample with available data (appendix exhibit A17, model 3).<sup>25</sup> Young adults with any of the assessed individual ACEs except parental death were significantly more likely to have a teenage birth (from 25 percent [parental incarceration] to 73 percent [parental separation] higher probability; exhibit 2), but the association between childhood physical or emotional abuse and this outcome was sensitive to childhood socioeconomic status (appendix exhibit A17, model 3).<sup>25</sup> Study subjects who had parental separation or parental felony charges for sexual abuse during childhood were significantly more likely to have household poverty (27 percent and 43 percent higher probability, respectively) (exhibit 2). All ACEs except parental death (27 percent lower probability) were significantly associated with higher probability of being in a household that

received housing assistance in young adulthood (up to 67 percent [parental separation] higher probability), although associations with parental incarceration, physical or emotional abuse, and sexual abuse were sensitive to childhood socioeconomic status (appendix exhibit A17, model 3).<sup>25</sup>

Each assessed individual ACE was significantly associated with Medicaid enrollment in young adulthood (from 23 percent [witnessing intimate partner violence] to 52 percent [parental separation] higher probability) (exhibit 2). Young adults who experienced parental death or parental felony charges for SUD, child physical or emotional abuse, or child sexual abuse during childhood were slightly less likely to be employed (1–3 percent lower probability) in primary models (exhibit 2), although the associations with parental death and abuse charges were sensitive to childhood socioeconomic status (appendix exhibit A17, models 2 and 3).<sup>25</sup> Young adults whose parents separated during child-

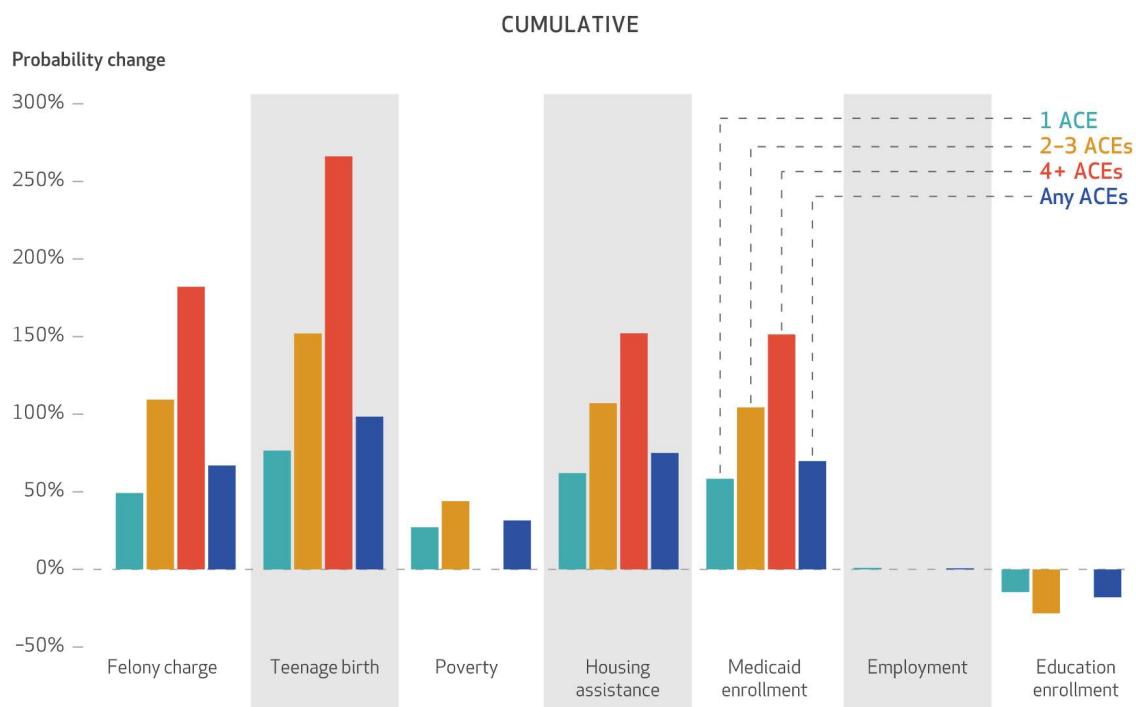
hood were slightly more likely to be employed (2 percent higher probability; exhibit 2), regardless of controls for childhood socioeconomic status (appendix exhibit A17, models 2 and 3).<sup>25</sup> Young adults with parental death, parental separation, witnessing intimate partner violence, parental SUD, or parental child sexual abuse were less likely to be enrolled in education than young adults in the primary models (from 11 percent [parental death] to 20 percent [sexual abuse] lower probability) (exhibit 2), although each of these associations, except for parental separation, was sensitive to childhood socioeconomic status (appendix exhibit A17, models 2 and 3).<sup>25</sup>

**CUMULATIVE ACES** Young adults with any ACEs had a higher probability of a felony charge (67 percent), having a teenage birth (98 percent), having household poverty (32 percent), having household housing assistance (75 percent), having Medicaid enrollment (70 percent), and being employed (1 percent), but lower probability of being enrolled in education (-18 percent), compared to young adults with no ACEs (exhibit 3). Study subjects' number of ACEs was correlated with the magnitude of these estimated associations. For example, having one, two to

three, or four or more ACEs compared with no ACEs was significantly associated with a 49 percent (one ACE), 109 percent (two to three ACEs), and 182 percent (four or more ACEs) higher probability of a felony charge, respectively, and having one or two to three ACEs was significantly associated with progressively lower probability (-15 percent and -28 percent, respectively) of education enrollment. Having one ACE was associated with a slightly increased (1 percent) probability of employment, but there was no statistically significant association with higher ACEs counts. In sensitivity analyses, dropping the control for parental income during study subjects' childhoods did not yield substantively different results (appendix exhibit A17, model 2).<sup>25</sup> Additional controls for childhood socioeconomic status among the smaller analysis sample with available data did not change the direction or significance of most measured associations from the primary models, except for the association between any ACEs and modestly higher young adult employment, and one ACE and both employment and education enrollment ceased to be statistically significant with the additional controls (appendix exhibit A17, model 3).<sup>25</sup> Overall, the added childhood socioeconom-

### EXHIBIT 3

Probability changes in socioeconomic disadvantages associated with cumulative adverse childhood experiences (ACEs) for people in 4 states who were ages 18–22 during 2017–21



**SOURCES** Authors' analysis of data from multiple sources in the Census Bureau Data Linkage Infrastructure; Authors' analysis of events during 2017–2021 among 3,400–930,000 people (ages 18–22) born during 1999–2003 in Maryland, Michigan, North Carolina, and North Dakota. **NOTE** Only statistically significant model results are depicted in this figure ( $p < 0.05$ ).

ic status controls in model 3 modestly reduced the increased probability of young adult socioeconomic disadvantages associated with ACEs, suggesting a protective effect from more socioeconomic advantages in childhood.

### Discussion

In this study, young adults with ACEs were more likely to have felony charges, be teenage parents, live in a household with poverty or housing assistance, have Medicaid, and be employed, and were less likely to be enrolled in education by ages 18–22 compared to their peers without ACEs. Analysis of cumulative ACEs supported previous studies documenting a dose-response relationship between ACEs and harmful long-term outcomes. Although many large-sample studies of ACEs have cross-sectionally examined the association between retrospective self-reported ACEs and current adult health outcomes, this study used anonymized linked administrative, census, and survey data sources to longitudinally examine ACEs along with young adult socioeconomic outcomes among a large population-based study sample. This study's unique data approach allowed assessment of ACEs without either reliance on mandatory reporting laws for child abuse and neglect or ethical and methodological considerations involved with self-report or parent-report survey data collection. Although this study underestimated the prevalence of some ACEs compared with self-reported data sources, the study's data linkage infrastructure benefited from being a cost-effective way to investigate people's longitudinal experiences compared with traditional data collection methods for longitudinal studies.

This study's primary models provide the most relevant and generalizable evidence for public health decision making and investments in population-based prevention strategies. One reason for this is that average exposure effects, as measured among the largest available sample, tend to be most applicable for forecasting the cost-effectiveness of public health prevention strategies. Nonetheless, it is important to consider that this study's measured associations between ACEs and young adult socioeconomic disadvantages were most pronounced among people who had multiple ACEs or more childhood socioeconomic disadvantages, pointing to a mitigating effect from greater economic resources during childhood.

When we controlled for several indicators of childhood socioeconomic status, parental death in isolation was not associated with increased probability of young adult socioeconomic disadvantages. Parental death is also the only as-

## **Evidence on the long-term socioeconomic burden of childhood adversity is essential to increase understanding of the value of investments in prevention strategies.**

sessed ACE with specific, widely available, and relatively generous associated monetary support during childhood via Social Security Administration survivor benefits. In contrast, this study's measured associations between young adult socioeconomic disadvantages and parental separation persisted despite multiple controls for childhood socioeconomic status, as did this study's estimated higher probability of felony charges, teenage birth, housing assistance, and Medicaid enrollment associated with parental incarceration, parental SUD, witnessing intimate partner violence, and sexual abuse. As time passes and CJARS expands to additional states, there will be opportunities for analysis among an expanded study sample at older ages.

Previous research has identified only limited concordance between administrative and self-reported measures of childhood adversity.<sup>34–36</sup> Such studies contradict the notion that administrative reports are a subset of self-reported adversity, and they point to self-reported adversity having a stronger association with harmful outcomes. This is further evidence that this study's methods may have underestimated the impact of ACEs on young adult socioeconomic disadvantages. Additional direct comparisons of childhood adversity reporting type—subjective, administrative, and criminal justice—will improve understanding of the benefits and drawbacks of different methods to identify childhood adversity and assess its long-term effects.

### Conclusion

Children with ACEs are substantially more likely to have socioeconomic disadvantages as young

adults. Evidence on the long-term socio-economic burden of childhood adversity is essential to increase understanding of the value of investments in prevention strategies. The CDC resource “Adverse Childhood Experiences

(ACEs) Prevention: Resource for Action”<sup>1</sup> can help states, tribes, and communities use the best available evidence to prevent ACEs from happening in the first place, as well as to lessen harms when ACEs do occur. ■

The findings and conclusions in this article are those of the authors and do not necessarily represent the official positions of the Centers for Disease Control and Prevention or the Census

Bureau. The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data (Project P-7500378, Disclosure

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